CROP TALK

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Tillage to Swear By

by Greg Stewart, Corn Specialist, OMAFRA

Plow - a four letter word? No-till – the moral high ground within tillage systems? What about strip-till, ridge-till, vertical-till, mulch-till, placebo-till, testosterone-till or conservation-till?

Over the years we have had a great time defining and labelling the way we till the soil. In some cases the discussion has become quite heated, as ardent no-tillers have challenged the more conventionally minded to change. Sometimes the argument has had a cost of production spin, especially when commodity prices were low. At other times the emphasis has been on soil conservation and the merits of leaving enough residue to protect soil from wind and water erosion.

In Ontario, the trend towards conservation tillage has ebbed and flowed. So where are we now? Consider the advancements that might influence tillage systems:

- significantly improved planting equipment,
- a whole host of planter modifications to foster reduced tillage success,
- a complete new segment of "vertical" tillage equipment that is designed to handle high residue situations,
- seed that is more tolerant to reduced tillage stress,
- herbicide resistant crops, and
- seed treatments that mitigate some of the challenges of unplowed seedbeds.

And yet when we looked around Ontario in the spring of 2012 there was arguably less ground covered with residue than in quite some time.

Perhaps it is time to refocus on the end game and not the titles.

Cropline 1-888-449-0937

Ministry of Agriculture, Food and Rural Affairs
Ontario

30% Ground Cover

Research has identified the maintenance of a minimum of 30% ground cover as critical in the protection against wind and water erosion. The goal should be to have your soil covered with at least 30% cover (dead or alive) all season long. Perhaps no one cares any more what you call it. Just use the great arsenal of equipment and technology that is out there and get it done. Hey, you might even use a plow (note 4 letter spelling) and if you quickly seeded a cover crop, 30% cover might be rapidly restored.

Here are few other considerations:

1. Leaving surfaces too rough in the fall means multiple passes in the spring and eventually less residue to conserve the soil. This is particularly challenging after low residue crops like soybeans.

2. Vertical tillage tools have given producers a more complete arsenal of equipment that can prepare a seedbed while maintaining high residue levels. Target the use of these tools to still have 30 % cover after planting is complete.

3. Producers determined to eliminate compaction and do some fall tillage should aim for a system that can leave significant residue in the fall such that after spring operations 30 % cover is still possible.

4. A seedbed left relatively smooth with good residue cover can, on many lighter textured soils, be planted directly without any further residue reducing spring tillage.

Need Help Selecting a Cover Crop? - Check Out this New On-line Tool

by Adam Hayes, Soil Management Specialist– Field Crops, OMAFRA

The "Cover Crop Decision Tool" for Ontario is a new on-line tool to help in the selection of cover crops. The tool provides information on the attributes of cover crop species, such as suitable planting dates. The decision tool is easy to use. Various scenarios and mixtures can quickly be looked at.

How To Use the Tool

- Go to http://www.mccc.msu.edu.
- Click on "Cover Crops Selector" on the left side of the page under "Cover Crop Resources". On that page there is a link to instructions for the tool and a link to the tool.
- When you get to the tool, select "Ontario" and "your county". All the cover crop options and planting date ranges will be displayed.
- Select the crop grown in the field, and planting and harvest dates. The cover crops that can be planted after harvest will be displayed.
- Select the applicable field information. The cover crops that are unsuitable will be removed.
- Select the attributes you want from the cover crop, such as nitrogen source or scavenger, erosion fighter, soil builder, forage harvest value and weed fighter. Cover crops that do not meet your criteria will be removed.
- The remaining cover crops are rated for the attributes you selected.

Cover Crop Information

The Midwest Cover Crop Council website provides a wealth of information on cover crops. Cover crop information can also be found in OMAFRA Publication 811, *Agronomy Guide for Field Crops* (printed version or on-line http://bit.ly/omafrabuildsoil) in the soil management chapter, and on the OMAFRA website http://bit.ly/omafracovercrops.

Development of the Cover Crop Decision Tool was led by the Midwest Cover Crop Council. An Ontario team of university researchers, OMAFRA specialists, crop advisors, seed suppliers and farmers worked on the project. The team reviewed and refined information from the Sustainable Agriculture Research and Education (SARE) publication "Managing Cover Crops Profitably, 3rd edition" (http://www.sare.org). The information and ratings are based on the team consensus from literature, research results, on-farm experience and practical knowledge.

Early Summer Grazing Tips

by Jack Kyle, Grazier Specialist, OMAFRA

It is June, and the grass is growing faster than you can get animals out on the paddocks to use it. Pasture management decisions made today will enhance pay off later this fall, but it's time to get on it because, in the words of June Carter Cash, "Time's a wastin'." Planning for the grazing season ahead includes feed budgeting, seeding, stockpiling, fly control, mineral placement, rotation scheduling, weed control and making hay.

Prepare a Feed Budget

Preparing a feed budget for the remainder of the grazing season will assist you in determining whether you need to find extra sources of pasture. A feed budget is simply adding up the quantity of forage you will need for your livestock and comparing that total to the estimated quantity of forage that will be available for the remainder of the season.

To determine the quantity of dry matter required for livestock needs, use 3% of the total body weight (for high producing animals you could use 4%). Approximate the quantity of forage based on the density of the stands and estimated yield.

If you find that you do not have enough available forage for your livestock's dry matter requirements in the above comparison, then consider one or more of the following suggestions.

Seed Annuals

Annuals seeded in early- to mid-summer will provide supplemental grazing forage for late-summer and into the fall. Sorghum-sudan seeded in June will provide a large quantity of high quality grazing in August. Forage or stubble turnips, fodder rape or kale offer grazing from late-summer to late-fall. The brassicas have good frost tolerance, which allows them to be utilized long after other annuals and perennials have stopped growing for the season. Cereals planted in late-July or early-August provide September and October grazing. Corn is another crop that can be effectively grazed during its wide window of opportunity, from August to December.

Stockpile Forage

Extend the grazing season with stockpiled forage. Pasture fields allowed to re-grow from mid-July can accumulate a significant quantity of forage for grazing after the growing season has ended. It is during the early summer that you need to take the first steps to have a successful late-fall grazing opportunity. These fields should be allowed to grow from mid- to late-July to accumulate forage for later use. Apply a high nitrogen fertilizer to achieve optimum growth. Fields with trefoil and clovers will provide better late-season grazing than alfalfa fields. Of the grass species, tall fescue is an excellent stockpile grass, as it holds its quality well into the winter.

Orchard grass breaks down with frost and will not provide the quantity or quality of grazing as tall fescue or the brome grasses.

Fly Control
Livestock that are being irritated by flies are not going to be as productive as those that can focus on grazing undisturbed. Early fly control measures, such as back rubbers and ear tags, will pay off later in the season. These are two available options that will reduce the fly population and provide relief for your livestock, resulting in improved gains.

Salt and Mineral
Salt and mineral should be provided throughout the grazing season. Position salt and mineral away from the water source to encourage more even pasture utilization. Use a mineral program which meets the needs of your livestock and takes into consideration the type of cattle and the quality of the forage available.

Slow Rotation
As we move into the warmer temperatures of the summer, grass growth will slow and therefore you will need to slow the rate of pasture rotation. Slowing the rotation gives the recently grazed pastures more time to re-grow. This rest and recovery period will keep your pastures productive through the entire grazing season. Overgrazed pastures take much longer to grow back, have lower drought tolerance and are much more susceptible to weed infestations.

Weed Control
Late-June is an ideal time to clip pastures if there is an accumulation of mature grass plants or evidence of a weed problem. Clipping mature grass will stimulate new growth. At the same time, clipping weeds will remove their seed heads and reduce the chance of the plants reseeding themselves. If the weed pressure is very low, consider spot spraying to prevent a further increase in weed pressure.

Make Hay (if necessary)
By mid-June, all pastures in a rotational system should have been grazed at least once. If there are several paddocks not yet grazed, consider making hay with one or more of these paddocks. If you decide to make hay, consider cutting with a 3 - 4 inch (8–10 cm) stubble to promote faster re-growth of the grasses.

June is an ideal time to evaluate your pasture management and make any necessary adjustments to your grazing program to ensure productivity into the fall. Now is the time to consider seeding for supplemental grazing, stockpiling forage, slowing rotation and making hay to ensure re-growth later in the season. Assess your fly control, mineral and weed control programs. July may be too late to make adjustments that will allow you to enhance the productivity of your pasture system. June is the optimal time to act, so let's go, time's a wastin'!

Fungicides in Spring Cereals

by Scott Banks, Emerging Crops Specialist, OMAFRA

Disease pressure in oats, barley and spring wheat can make for poor grain yield and quality. With the currently higher commodity prices and the strong demand for straw, there is a greater payback to fungicides on spring cereals. The application of a fungicide at the right crop stage impacts the effectiveness of fungicides to suppress disease pressure, whether it is leaf, stem or grain diseases.

Given the earlier planting of several spring cereal fields this year, growers should plan to scout their fields early to determine the cereal growth stage. Fungicide application timing will likely be two to three weeks earlier than normal.

Oats

In southern Ontario, oats need to have a fungicide applied at flag-leaf emergence stage for leaf diseases, such as crown rust. The genetic tolerance of most of the oat varieties to rust has broken down. Unless a fungicide is applied, the yield and quality loss from oat rust can be devastating (Figure 1). Leaf diseases are less frequently an issue in northern Ontario.

Figure 1. Flag Leaf Emerged Cereal Stage (Zadock 37)

The greatest yield response in oats is when the fungicides are applied at the "flag leaf emerged" stage (Zadock 37). This is when the last leaf emerges from the stem before the head emerges (Figure 2).

In a 2008 oat fungicide trial in eastern Ontario, there was a 20% yield increase with the use of a fungicide on a variety where the genetic rust tolerance has broken down

Figure 2 - 2008 Fungicide Trial on Oats – Note lodging in unsprayed strips

Fusarium Head Blight (FHB)
For fusarium head blight (FHB) suppression in spring wheat and barley, the main fungicides are Prosaro and Caramba. The North Central Regional Committee on Management of Small Grain Diseases (NCERA-184) rated the fungicide efficacy for foliar diseases. The efficacy ratings of Prosaro and Carmaba for stripe rust, leaf rust, stem rust and FHB were the same.

Both products are most effective if applied at the correct growth stage.

- **Prosaro**
  Apply when at least 75% of the heads have emerged to 50% of the heads on the main stem are flowering.
- **Caramba**
  Apply when the cereal is at the 20% flowering stage (Figure 3 beginning of flowering).

Figure 3 – Beginning of Flowering stage of a Wheat Head – note pollen sacks

Proper nozzles must be used to maximize coverage and product efficacy for FHB suppression. The proper nozzle setup is the Turbo FloodJet. This setup has alternating forward and backward nozzles that target the fungicide on both sides of the cereal head (Figure 4). On-farm trials have shown a 4 - 8 bushel per acre grain yield advantage in spring wheat, and about 30 - 50% reduction in fusarium damaged kernels (%FDK).

Figure 4 - Turbo FloodJet – alternating forward and backward nozzle set up for fungicide application for FHB suppression.

For more information about disease control management strategies and available fungicide products, refer to "A Field Guide to Cereal Staging", OMAFRA Publication 811, Agronomy Guide (p. 252) (www.omafra.gov.on.ca/english/crops/pub811/14cereal.htm) and Publication 812, Field Crop Protection Guide (p.52-81) (http://www.omafra.gov.on.ca/english/crops/pub812/p812toc.html).

Grub Damage in Hay Fields and Pasture

by Joel Bagg, Forage Specialist, OMAFRA

When grubs hit hard, forage supplies dwindle fast! Stand loss in hay fields and pastures due to grub damage is becoming more common.
Warm open falls and warm springs are ideal for grub feeding activity. (Figure 1)

Figure 1. Grub damage in an Ontario hay field, 2008 *Photo Credit: Robert Moloney, FS Partners*

The result is a thin, weedy stand with low yields , and poor resistance to drought. Grubs prefer feeding on grass root systems over legumes.

They also prefer lighter textured soils. Unfortunately, control options are nonexistant, other than rotation to a less susceptible crop.

Which Type Of Grub?
Though the most common grub in field crops is European chafer, other grubs can cause damage as well. It is critical to determine which grub you have and the level of infestation. Dig in the bare or dying areas of your fields and look for grubs. Examining the rasters or anal hairs at the butt end of the larvae will determine the type of grub.
To more easily handle the grub either:

- cut the grub in half so that it stops squirming, leaving you with just the bottom half, or
- roll a piece of paper into a tube, let the grub crawl in, pinch the tube off so that the butt end still sticks out but the head and biting part does not.

Use a magnifying glass to get a good look at the rasters.

1. If the rasters have a Y- or deep, long V-shaped pattern (like an "open zipper"), it is a European chafer grub (Figure 2a).

Figure 2a. European Chafer Grub - raster pattern. Note open "zipper"

2. If the rasters are in an oval-shaped pattern with the hairs running parallel to each other, it is a **June beetle** grub (Figure 2b).

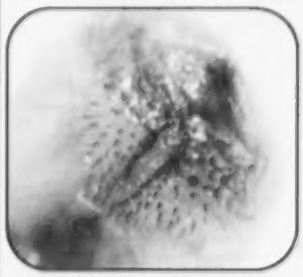

Figure 2b. June Beetle Grub Raster Pattern
Photo Credit Art Schaafsma, U of G, Ridgetown Campus

3. If you live in the Niagara area, you may be dealing with **Japanese beetle** grubs, which have short V-shaped raster patterns (Figure 2c).

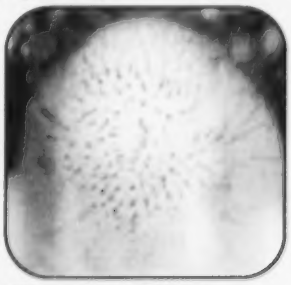

Figure 2c. Japanese beetle grub - raster pattern

Different Grubs Have Different Life Cycles & Feeding Patterns

1. **European chafer** is a one year grub. The larvae feed into late-fall and start feeding again in very early spring, until they pupate by mid-May. Then there is a summer break from larvae feeding. All of the feeding damage by chafer is done in late-fall and early-spring. This is why soybeans tend to escape chafer damage, because the crop is planted

later and grows when the larvae are not actively feeding.

2. **June beetle** grubs live in the soil for 3 years, making it the most troublesome. Two of those years are spent as larvae that feed on the crop throughout the year. June beetle grubs can affect soybeans and most crops because the larvae are feeding all summer long, whenever the crops are growing.
3. **Japanese beetle** grubs are common in Niagara Region. They are a one year grub similar to the European chafer, except Japanese beetle grubs feed longer into the summer before pupating. Feeding damage by Japanese beetle grubs can continue until early-June, until they pupate to become adults. Feeding begins again in late-summer, after the adults have laid their eggs and the new larvae hatch and begin feeding.

Control Option – Rotate To Corn, Soybeans or Cereals?

There are no insecticides that will control grub damage in established forage crops. The best option in severely damaged fields is tillage (this exposes the grubs to predators) followed by replanting the field into a crop that has insecticide seed treatment options available (corn, soybeans, cereals).

One year out of forages is required to reduce grub populations for chafer and Japanese beetle, and 3 years is usually required for June beetle control.

Neonicotinoid insecticides (Poncho, Cruiser) give protection in corn, cereals and soybeans. If you are finding 2 - 3 chafer grubs per square foot, an insecticide seed treatment is required. With very high infestations, a higher label rate of insecticide is necessary.

If your goal is to re-establish forage the following year in a field with European chafers, corn is the preferred rotation crop. Chafers will lay eggs in soybeans, but not in corn. Planting soybeans can result in grub injury to the newly seeded forage crop the following spring.

Scout for grubs again in early-fall to determine if numbers exist that require seed treatment the following spring, or a different crop to avoid injury.

Refer to the *Field Crop Protection Guide*, OMAFRA Publication 812.
http://www.omafra.gov.on.ca/english/crops/pub812/p812toc.html

More From the Land, Rather than More Land!

by Scott Banks, Emerging Crop Specialist, Nancy Noecker, Cow-Calf Specialist, & Jack Kyle, Grazier Specialist, OMAFRA

With the renewed optimism in corn, soybeans, wheat and other cash crops, there is more pressure to produce more on each acre of land. There has been some loss of hay and pasture land to these crops. Forage inventories are tight and hay prices are at record levels. Double cropping, by seeding a cover crop after a cereal crop, is an opportunity to produce additional forage for your livestock. Oats seeded after winter wheat harvest with manure applied can yield 1 - 3.5 tonne of dry matter (DM) per acre. Even in fields without manure, oats can yield 0.5 – 1.5 tonnes of forage DM per acre. At hay prices of well over $100 per tonne, forage cover crops can give a good return in addition to the cereal crop harvested.

Summer Seeded Forage Cover Crop Study

Many cover crop plant species are used as forage, such as oats, barley, peas, triticale, rye, turnip, and various mixtures. A 2005 cover crop study compared red clover underseeded in the winter wheat to oats, oilseed radish, peas, annual ryegrass and sudan grass seeded after a cereal crop were harvested . (Figure 1) Applying manure before seeding significantly increased forage yield, with the exception of red clover. Oats produced the most forage yield, with the exception of red clover with no manure or annual ryegrass with manure applied. Volunteer winter cereals yielded only 50 - 75% of a seeded oat forage yield. In another study where cover crops followed spring wheat, the volunteer spring wheat yielded about the same as many of the cover crops. In this study, cover crop yields were 0.5 - 1 tonne per acre. In both these studies, the highest forage yields were from annual ryegrass with an application of manure.

Establishment

It may seem early to be talking about August seeding, but now is the time to start planning. Establishing a cover crop can be done using a no-till drill. Alternately, broadcasting the seed followed by a light tillage pass, such as a cultivator or rotary harrow, to incorporate the seed. Some tillage before seeding can reduce disease and weed pressure from the preceding cereal crop. Under dry conditions, following with a packer will firm the soil for better to seed-to-soil contact and help retain moisture for better emergence. Manure can be applied immediately before planting and incorporation will capture more of the readily available nitrogen in the manure.

Harvest

Cover crops can be easy grazed or harvested as silage or baleage. Strip grazing with cattle or sheep is very efficient. (Figure 2) These crops are essentially impossible to make into dry hay at that time of year. Cereal crops summer seeded as a second crop with adequate moisture are

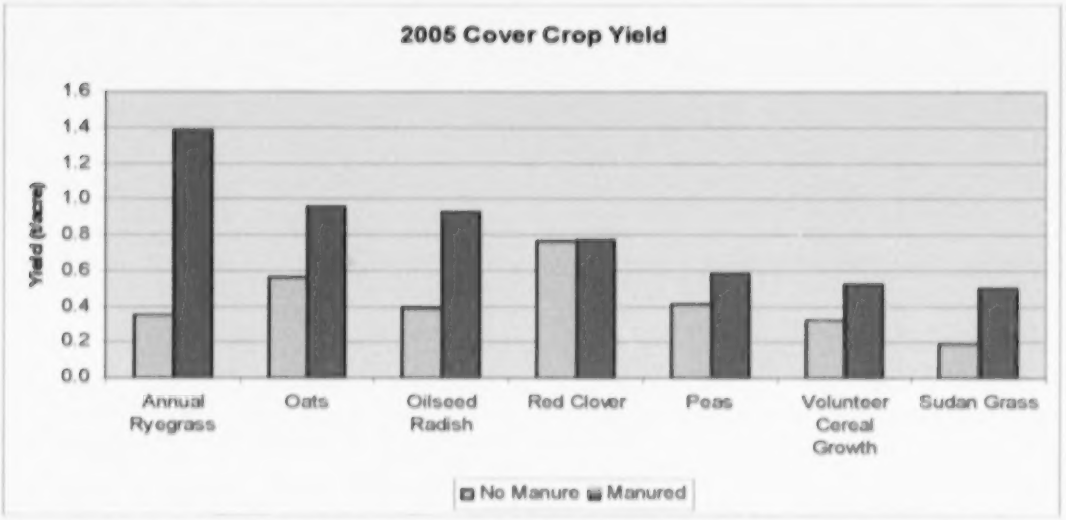

Figure 1. 2005 Cover Crop Study Which Compared Oats, Oilseed Radish, Peas, Red Clover, Annual Ryegrass And Sudan Grass

usually ready to begin grazing about 45 – 60 days after planting (Figure 3). They should be grazed before the heading-stage of the cereals, as forage quality will then begin to decline.

Figure 2: Strip Grazing of Kale, Pea, Barley & Oat mixture

A question that often is asked is "does late-fall and winter grazing compact the soil?" Research from Nebraska with beef cattle showed **winter grazing** crop residues had no significant effect on the following year grain crop yield, and additional tillage was not required. However, **spring grazing** increased the soil's bulk density and decreased water infiltration rate. Therefore, cattle should not graze crop residues after the soil has thawed in the spring.

Figure 3: Barley seeded following winter wheat for fall grazing.

Benefits

Using cover crops following a cereal crop provides soil protection from wind and heavy rains in the fall months before freeze up. It also helps build soil organic matter and grazing livestock can improve nutrient recycling. Red clover can fix nitrogen for the following crop. Cover crops also provide the livestock farmer a place to spread manure in late-summer and reduces the nitrogen that could be lost to the environment. The most immediate benefit to the livestock farmer will be the extra feed produced, getting more from the land, rather than using more land!

For more information about Cover Crops, see Cover Crops: Adaptation and Use of Cover Crops, http://omafra.gov.on.ca/english/crops/facts/cover_crops01/cover.htm

Cover Crops: Cover Crop Types - http://omafra.gov.on.ca/english/crops/facts/cover_crops01/cover_types.htm

Cover Crops: Choosing a Cover Crop - http://www.omafra.gov.on.ca/english/crops/facts/cover_crops01/choosing.htm

Wild Parsnip—Evaluation of Herbicide Control Options

by Gilles Quesnel, Field Crop IPM Specialist, OMAFRA

Wild parsnip is quite common in eastern Ontario, but can also be found throughout most the province. While this plant does not have the notoriety of giant hogweed, its sap does contain some of the same photosensitizing compounds as those found in giant hogweed, which cause severe skin burn-like rashes (Figure 1). Wild parsnip burns differ from rashes caused by poison ivy. Wild parsnip sap causes a skin reaction by destroying skin cell, whereas poison ivy causes an allergic skin reaction.

Figure 1. Skin Reaction to Wild Parsnip Sap

Description

Wild parsnip (Figure 2) occurs mainly on roadsides, fencerows, meadows and to a lesser extent, on the edges of cropped fields. Details to identify wild parsnip are available on the weedinfo.ca website (http://bit.ly/KWmR6w).

Figure 2. Flowering Wild Parsnip

Control

Wild parsnip can only be controlled mechanically by cutting the plant just below the soil surface. While mowing will not kill wild parsnip, it will help reduce seed production.

Glyphosate is effective at controlling wild parsnip, but the herbicide also destroys all the vegetation sprayed. This results in the exposure of bare ground and the potential for soil erosion and/or ditch bank destabilization.

A field experiment was initiated in 2009 to rate efficacy of five broadleaf weed herbicides that could control wild parsnip, without impacting grass vegetation in the lower canopy. The herbicide treatments were applied to wild parsnip at vegetative stage in the fall of the year. The control ratings were taken the following May and June. Table 1 summarizes the efficacy of the post-emerged broadleaf weed control tested.

Table 1. Average wild parsnip control obtained with various post-emergence broadleaf weed herbicides.

Treatments	Percent Control
Milestone	99%
Distinct WDG	86%
Classic 25DF	64%
Estaprop Plus (582 g/L)	61%
Banvel II 480 g/L	24%

For more information on products and product rates for the control of wild parsnip, refer to the ROADSIDES & NON-CROP AREAS section of OMAFRA Publication 75, Guide to Weed Control, available at http://bit.ly/omafrapub75.

Summer Applied Solid Manure—Is This the Year?

by Christine Brown, Nutrient Management Field Crop Lead, OMAFRA

Materials such as solid manure that are high in carbon and organic nitrogen will provide greater fertility to next year's corn crop when they are applied after wheat harvest.

Looks like 2012 will see an early wheat harvest. Since not every acre of harvested wheat will be double cropped, it presents an opportunity for building soil fertility and organic matter with some solid manure or other organic amendments. Before heading to the field, take a few minutes to consider which materials (http://fieldcropnews.com/?p=1779) will provide the biggest benefit and how can any risks associated with various products be minimized

A recent University of Guelph manure application study led by Dr. John Lauzon, re-confirmed that solid organic materials applied after wheat harvest or in early fall will provide more fertility value than the same material applied in the spring. This is opposite of liquid materials. It is mainly due to the low ammonium and high organic nitrogen content of solid materials, especially those high in bedding materials. Organic nitrogen is mineralized over time by soil micro-organisms.

The longer the window of good growing conditions, the more time the organisms have to break down the carbon into organic matter sources.

Benefits of Summer Application Of Solid Manure

- Organic matter and nutrient benefit for the soil is increased.
- Commercial fertilizer inputs are reduced, soil bugs are fed helping to improve soil health, and the risk of compaction is reduced.
- More time is available (compared to spring or late-fall) to apply to fields further away from the storage.
- There is opportunity to seed a cover crop to maximize soil health benefits.

Reduced Risks With Solid Manure

The risks associated with solid materials are lower than with liquid materials. Where liquid manure or liquid non-agricultural sourced materials (NASM) are being summer applied, the addition of cover crops will help to prevent ammonium-N converted to nitrate-N from moving below the root zone, and will help hold nutrients in "green" form. In some cases, the cover crop can grow enough to allow a harvest (i.e., oatlage). Nitrogen held in most cover crops, with the exception of red clover, is usually not accounted for in the corn crop that follows. More likely it is feeding the soil micro-organisms, breaking down residue and building a healthier soil.

Risks Associated With Summer Application Of Liquid & Solid Manures

- Liquid manures have a higher risk of runoff (in the case of a sudden thunderstorm) and for getting into tile drains, especially in no-till cropping systems. Manure in tile drains can end up in rivers or streams where the ammonia will kill fish.
- Runoff from liquid or solid materials containing phosphorus is also harmful in water sources. Pre-tillage or injection, so that earthworm and root channels are disturbed, will increase infiltration of liquids and nutrients, and reduce odours.
- Liquid manure has a higher ammonium-N content. If liquids are surface applied to dry soils under August conditions (lazy-hazy days of summer), 75% of the ammonium portion could volatilize into thin air. Nutrient and odour-rich materials are best applied later in the season when soil and air temperatures are closer to 10 °C.
- Liquid manure has a higher ammonium-N content that converts quickly to nitrate-N under summer conditions.
- Nitrate-N can move with water. If the fall turns wet and there is no growing crop to take the nitrate, it will move below the root zone and potentially to tile drains or ground water. Either way, that nitrogen is not available for next year's crop.

As the manure is applied to those early harvested wheat fields, remember to take a manure sample (a soil sample would be a good idea too). Be sure to account for the nutrients when planning commercial fertilizer additions, and watch the earthworms work their magic!

Activation Laboratories Ltd Joins OMAFRA's Accredited Soil Testing Program

by Christoph Kessel, Nutrition (Horticulture) - Program Lead, OMAFRA

Activation Laboratories Ltd. Ancaster, has recently been accredited under Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) "Accredited Soil Testing Program". They join seven other soil test laboratories currently accredited by OMAFRA:

- Exova Accutest Laboratory, Nepean;
- SGS Agrifood Laboratories, Guelph;
- A&L Canada Laboratories Inc. , London;
- Brookside Laboratories, New Knoxville, Ohio;
- FoReST Laboratory, Lakehead University, Thunder Bay,
- Stratford Agri Analysis, Stratford; and
- University of Guelph Laboratory Services, Guelph.

To be accredited, laboratories must demonstrate accurate analyses on quarterly exchange samples. They must have an acceptable internal quality control system, and adequate equipment to analyze samples.

The OMAFRA accredited soil testing program provides Ontario's farmers with assurance that participating labs are providing accurate analytical results. Analytical methods were chosen to provide accurate results on the range of Ontario soils. These analyses support nitrogen, phosphate, potash and magnesium fertilizer recommendations, along with the amount and type of lime to apply. This provides the basis for responsible management of nutrients, so that fertilizers and manure applications are both agronomic and environmentally sound.

The OMAFRA accredited soil tests are:

Nutrient Analyzed	Accredited Soil Test
plant-available phosphorus	sodium bicarbonate extractable
potassium, magnesium	ammonium acetate extractable
manganese	index of soil pH & extractable manganese
zinc	Index of soil pH and extractable zinc
pH	saturate paste extract
lime requirement	SMP buffer pH
nitrate-nitrogen	potassium chloride

Accreditation does not include fertilizer recommendations made by agronomists working for the laboratory. However, with the accredited test results you can use the tables in OMAFRA Publication 811, *Agronomy Guide* to determine fertilizer recommendations. For OMAFRA Accredited Soil Laboratory contact information refer to www.omafra.gov.on.ca/english/crops/resource/soillabs.htm.

What's the Next Step In Precision Agriculture?

by Ian McDonald, Applied Research Coordinator, OMAFRA, Nicole Rabe, Land Use Specialist, OMAFRA

Precision agriculture means different things to different people. In Ontario, we have seen adoption of precision technologies, including combine yield monitors, light bars and other sophisticated ways of driving straight, and application mapping.

Yield Monitor, GIS, Variable Rate & Other Technologies
After a slow start with yield monitors, most of these have been readily adopted. Straight driving technologies have been adopted very quickly. Now we are seeing wider adoption of GIS-enabled auto shut-off systems for ensuring pesticides, seed and other inputs are not overlapped as field equipment crosses paths with previous passes.

Less common has been the acceptance of variable rate input technology. There is considerable disagreement on whether the systems are able to adequately identify management zone changes that would justify the change in input levels across a field. However, it is being practiced successfully by some.

One important thing that comes from yield monitor technology is the ability to "visualize" the fields. , Review of data trends over time allows development of good management zones. This is not just numbers, but a visual picture of what is happening in a field.

Unmanned Aerial Vehicles
The next step in precision technology may be the use of Unmanned Aerial Vehicles (UAV's) for monitoring ongoing crop production. These can enable us to "see" our crops visually, but also in terms of stresses that the human eye cannot see. Near infrared reflectance (NIR) cameras can measure response to stresses. Although imagery is available from aircraft and satellite systems, there are some distinct disadvantages associated with their use, such as cost, timeliness, accuracy, resolution, and flight path.

A farmer or agronomist can program a UAV to fly a directed path whenever they want. This allows a crop to be monitored to look for things that might be of interest in the growth of the crop. Advantages of UAV's over plane and satellite include flexibility, lower capital cost, ready learning, and no need to put people in harm's way.

These vehicles are capable of high resolution photography, video capture and NIR photography. Then there is a wide range of software choices available to "build" maps from the images and video captured. They can operate at various heights from 100 to 2,000 ft, cruise at speeds up to 60 km/hr for 30 to 60 minutes, and operate in winds up to 30 km/hr.

They have resolutions of as low as 3.6 cm, but 20 cm is typical. (Figure 1) They can take pictures of from 1 to 60 acres. What is exciting about this technology is that it gives you a view of your crops that is not attainable in any other way, and at various times during the growing season. Ask any "flying farmer" how much they see in their crops from the air that is not visible, even in thorough ground scouting.

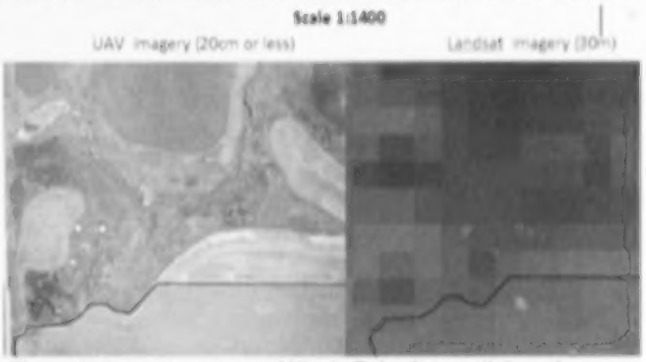

Figure 1. Images courtesy of Nicole Rabe from collaborative work with MAFRI and On-Demand Imagery Solutions (Brandon, MB.) showing the resolution potential of UAV's relative to other forms of imagery.

Possible uses of the technology include:

- scouting for disease, insect, and weeds,
- identifying problems fast,
- replant decisions
- visual recorded proof of issues
- record keeping that specified operations were completed,
- scouting deer, racoon and other critter damage,
- looking for "alternate crops" planted in your crops
- delineating management zones, and
- identifying field regions susceptible to soil erosion.

Figure 2 demonstrates the operational aspects of UAV's.

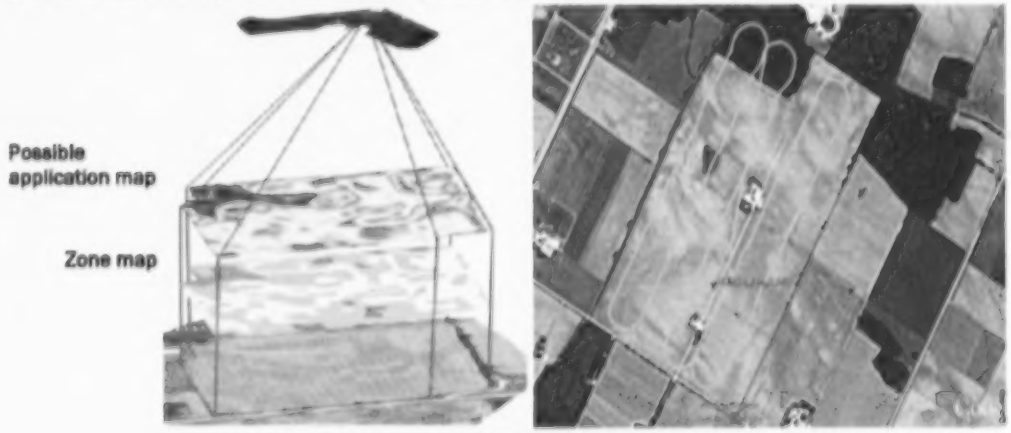

Figure 2. Example of how UAV flight can be used to capture images and develop mapping products that assist crop management (Ag Business & Crop Inc.)

Checkout these websites to get an idea of the range of products, and the capabilities:

CropCam
(http://www.cropcam.com)

AutoCopter
(http://www.autocopter.net/)

Swinglet Cam
(http:www.sensefly.com/)

Agricultural Information Contact Centre:
1-877-424-1300
E-mail: ag.info.omafra@ontario.ca
Northern Ontario Regional Office:
1-800-461- 6132
www.ontario.ca/omafra